

AMENDMENTS TO THE CLAIMS

Please amend claim 1 as follows:

1. (Amended) An optical disk apparatus comprising;

 a focusing means for focusing a light beam on a recording medium having first and second information faces;

 a moving means for moving a focal point of the light beam focused by said focusing means in a direction substantially perpendicular to the information faces of the recording medium;

 a light detecting means for detecting a reflected light of the focused light beam from the recording medium;

 [a focus control means for detecting a focus condition of the light beam irradiating the information faces on the basis of an output signal from said light detecting means, driving said moving means on the basis of the detection signal, and controlling the light beam so that the focus condition of the light beam becomes a prescribed focus condition;]

a focus condition detecting means for detecting a focus condition of the light beam irradiating the information faces on the basis of the digital signal from the light detecting means;

a focus control means for driving said moving means and controlling the light beam so that the focus condition of the light beam becomes a prescribed focus condition on the basis of an output signal from said focus condition detecting means;

 a focus jumping means for jumping the focal point of the light beam to a target information face which is one of the first information face and the second information face by driving said moving means; and

 a storage means for storing signals obtained when the focal point of the light beam is passed through the first and second information faces by driving said moving means so that the light beam goes away from or close to the recording medium;

 wherein, when a focus jumping is performed by said focus jumping means, a gain of said focus control means is changed according to the values stored in said storage means.

Please add new claims 16-44 as follows:

16. A digital signal processor for controlling a light beam of an optical disk apparatus on a recording medium having first and second information faces, the optical disk apparatus including a focusing lens for focusing a light beam on the recording medium having first and second information faces, a moving unit for moving a focal point of the light beam focused by the focusing lens in a direction substantially perpendicular to the information faces of the recording medium, a photodetector for detecting a reflected light of the focused light beam from the recording medium, an AD converter for converting an output signal from the photodetector to a digital signal, the digital signal processor comprising:

a focus condition detecting means for detecting a focus condition of the light beam irradiating the information faces on the basis of the digital signal from the AD converter;

a focus control means for driving the moving unit and controlling the light beam, so that the focus condition of the light beam becomes a prescribed focus condition on the basis of an output signal from said focus condition detecting means; and

a focus jumping means for driving the moving unit so that the focal point of the light beam moves from one of the first and second information faces of the recording medium to the other information face;

said focus jumping means comprising:

an accelerating signal generating means for generating an accelerating signal for moving the focal point of the light beam from one of the first and second information faces of the recording medium to the other information face;

a timing signal generating means for generating a timing signal that operates said focus control means on the basis of the output signal from the AD converter; and

a decelerating means for generating a decelerating signal for decelerating the moving speed of the focal point of the light beam in response to the timing signal from said timing signal generating means.

17. A digital signal processor for controlling a light beam of an optical disk apparatus on a recording medium having first and second information faces, the optical disk apparatus including a focusing lens for focusing a light beam on the recording medium having first and second information faces, a moving unit for moving a focal point of the light beam focused by the focusing lens in a direction substantially perpendicular to the information faces of the recording medium, a photodetector for detecting a reflected light of the focused light beam from the recording medium, an AD converter for converting an output signal from the photodetector to a digital signal, the digital signal processor comprising:

a focus condition detecting means for detecting a focus condition of the light beam irradiating the information faces on the basis of the digital signal from the AD converter;

a focus control means for driving the moving unit and controlling the light beam, so that the focus condition of the light beam becomes a prescribed focus condition on the basis of an output signal from said focus condition detecting means; and

a focus jumping means for driving the moving unit so that the focal point of the light beam moves from one of the first and second information faces of the recording medium to the other information face;

said focus jumping means comprising;

an accelerating means for generating an accelerating signal for moving the focal point of the light beam from one of said first and second information faces of the recording medium to the other information face; and

a decelerating means for generating a decelerating signal for decelerating the moving speed of the focal point of the light beam;

wherein the digital signal processor is arranged and configured such that a peak value and/or a time interval of the accelerating signal are changeable according to the moving direction of the focal point of the light beam.

18. The digital signal processor of claim 17,

wherein a peak value and a time interval of accelerating signal are determined so that a product of a peak value and a time interval of the accelerating signal is varied according to the moving direction of the focal point of the light beam.

19. The digital signal processor of claim 18,

wherein, when the optical disk apparatus functions as a horizontal-type optical disk apparatus, a product of a peak value and a time interval of the accelerating signal when the focal point of the light beam is moved from the lower information face to the upper information face is larger than a product of a peak value and a time interval of the accelerating signal when the focal point of the light beam is moved from the upper information face to the lower information face.

20. An optical disk apparatus comprising:

a focusing means for focusing a light beam on a recording medium having first and second information faces;

a moving means for moving a focal point of the light beam focused by said focusing means in a direction substantially perpendicular to the information faces of the recording medium;

a light detecting means for detecting a reflected light of the focused light beam from the recording medium;

a focus condition detecting means for detecting a focus condition of the light beam irradiating the information faces on the basis of an output signal from the light detecting means;

a focus control means for driving said moving means on the basis of an output signal from said focus condition detecting means, and controlling the light beam so that the focus condition of the light beam becomes a prescribed focus condition; and

a focus jumping means for moving the focal point of the light beam from the first information face to the second information face by driving said moving means;

said focus jumping means comprising;

an accelerating means for generating an accelerating signal for moving the focal point of the light beam from one of the first and second information faces of the recording medium to the other information face; and

a decelerating means for decelerating the moving speed of the focal point of the light beam;

wherein the accelerating signal is determined by a digital signal processor, and a product of a peak value and a time interval of the accelerating signal for moving the focal point of the light beam from the lower information face to the upper information face when the optical disk apparatus functions as a horizontal-type optical disk apparatus, is larger than a product of the peak value and the time interval of the accelerating signal when said optical disk apparatus functions as a vertical-type optical disk apparatus.

21. The optical disk apparatus of Claim 20,

wherein said digital signal processor controls the light beam emitted from the optical disk apparatus which performs recording into the recording medium having the first and second information faces,

said digital signal processor comprises:

a focus condition detecting means for detecting a focus condition of the light beam irradiating the information faces on the basis of the digital signal from the AD converter;

a focus control means for driving the moving unit and controlling the light beam, so that the focus condition of the light beam becomes a prescribed focus condition on the basis of an output signal from said focus condition detecting means; and

a focus jumping means for driving the moving unit so that the focal point of the light beam moves from one of the first and second information faces of the recording medium to the other information face;

said focus jumping means comprising:

an accelerating means for generating an accelerating signal for moving the focal point of the light beam from one of said first and second information faces of the recording medium to the other information face; and

a decelerating means for generating a decelerating signal for decelerating the moving speed of the focal point of the light beam;

said digital signal processor is adjusted such that a peak value and/or a time interval of the accelerating signal are changeable according to the moving direction of the focal point of the light beam, and

the peak value and the time interval of the accelerating signal are determined so that a product of the peak value and the time interval of the accelerating signal is varied according to the moving direction of the focal point of the light beam.

22. An optical disk apparatus comprising:

a focusing means for focusing a light beam on a recording medium having first and second information faces;

a moving means for moving a focal point of the light beam focused by said focusing means in a direction substantially perpendicular to the information faces of the recording medium;

a light detecting means for detecting a reflected light of the focused light beam from the recording medium;

a focus condition detecting means for detecting a focus condition of the light beam irradiating the information faces on the basis of an output signal from said light detecting means;

a focus control means for driving said moving means on the basis of an output signal from said focus condition detecting means, and controlling the light beam so that the focus condition of the light beam becomes a prescribed focus condition; and

a focus jumping means for moving the focal point of the light beam from the first information face to the second information face by driving said moving means;

said focus jumping means comprising:

an accelerating means for generating an accelerating signal for moving the focal point of the light beam from one of the first and second information faces of the recording medium to the other information face; and

a decelerating means for decelerating the moving speed of the focal point of the light beam;

wherein the accelerating signal is determined by a digital signal processor, and a product of a peak value and a time interval of the accelerating signal for moving the focal point of the light beam from the upper information face to the lower information face when the optical disk apparatus functions as a horizontal-type optical disk apparatus is smaller than a product of the peak value and the time interval of the accelerating signal when said optical disk apparatus functions as a vertical-type optical disk apparatus.

23. The optical disk apparatus of Claim 21,

wherein said digital signal processor controls the light beam emitted from the optical disk apparatus which performs recording into the recording medium having the first and second information faces,

said digital signal processor comprises:

a focus condition detecting means for detecting a focus condition of the light beam irradiating the information faces on the basis of the digital signal from the AD converter;

a focus control means for driving the moving unit and controlling the light beam, so that the focus condition of the light beam becomes a prescribed focus condition on the basis of an output signal from said focus condition detecting means; and

a focus jumping means for driving the moving unit so that the focal point of the light beam moves from one of the first and second information faces of the recording medium to the other information face;

said focus jumping means comprising:

an accelerating means for generating an accelerating signal for moving the focal point of the light beam from one of said first and second information faces of the recording medium to the other information face; and

a decelerating means for generating a decelerating signal for decelerating the moving speed of the focal point of the light beam;

said digital signal processor is adjusted such that a peak value and/or a time interval of the accelerating signal are changeable according to the moving direction of the focal point of the light beam, and

the peak value and the time interval of the accelerating signal are determined so that a product of the peak value and the time interval of the accelerating signal is varied according to the moving direction of the focal point of the light beam.

24. A digital signal processor for controlling a light beam of an optical disk apparatus on a recording medium having first and second information faces, the optical disk apparatus including a focusing lens for focusing a light beam on the recording medium having first and second information faces, a moving unit for moving a focal point of the light beam focused by the focusing lens in a direction substantially perpendicular to the information faces of the recording medium, a photodetector for detecting a reflected light of the focused light beam from the recording medium, an AD converter for converting an output signal from the photodetector to a digital signal, the digital signal processor comprising:

a focus condition detecting means for detecting a focus condition of the light beam irradiating the information faces on the basis of the digital signal from the AD converter;

a focus control means for driving the moving unit and controlling the light beam, so that the focus condition of the light beam becomes a prescribed focus condition on the basis of an output signal from said focus condition detecting means; and

a focus jumping means for driving the moving unit so that the focal point of the light beam moves from one of the first and second information faces of the recording medium to the other information face;

said focus jumping means comprising;

an accelerating means for generating an accelerating signal for moving the focal point of the light beam from one of said first and second information faces of the recording medium to the other information face; and

a decelerating means for generating a decelerating signal for decelerating the moving speed of the focal point of the light beam;

wherein the digital signal processor is arranged and configured such that a peak value and/or a time interval of the decelerating signal are changeable according to the moving direction of the focal point of the light beam.

25. The digital processor of claim 22,

wherein a peak value and a time interval of decelerating signal are determined so that a product of a peak value and a time interval of the decelerating signal is varied according to the moving direction of the focal point of the light beam.

26. The digital signal processor of claim 23,

wherein, when the optical disk apparatus functions as a horizontal-type optical disk apparatus, a product of a peak value and a time interval of the decelerating signal when the focal point of the light beam is moved from the lower information face to the upper information face is smaller than a product of a peak value and a time interval of the accelerating signal when the focal point of the light beam is moved from the upper information face to the lower information face.

27. An optical disk apparatus comprising:

a focusing means for focusing a light beam on a recording medium having first and second information faces;

a moving means for moving a focal point of the light beam focused by said focusing means in a direction substantially perpendicular to the information faces of the recording medium;

a light detecting means for detecting a reflected light of the focused light beam from the recording medium;

a focus condition detecting means for detecting a focus condition of the light beam irradiating the information faces on the basis of an output signal from said light detecting means;

a focus control means for driving said moving means on the basis of an output signal from said focus condition detecting means, and controlling the light beam so that the focus condition of the light beam becomes a prescribed focus condition; and

a focus jumping means for moving the focal point of the light beam from the first information face to the second information face by driving said moving means;

said focus jumping means comprising;

an accelerating means for generating an accelerating signal for moving the focal point of the light beam from one of the first and second information faces of the recording medium to the other information face; and

a decelerating means for generating a decelerating signal for decelerating the moving speed of the focal point of the light beam;

wherein the decelerating signal is determined by a digital signal processor, and a product of a peak value and a time interval of the decelerating signal for moving the focal point of the light beam from the lower information face to the upper information face when the optical disk apparatus functions as a horizontal-type optical disk apparatus, is smaller than a product of the peak value and the time interval of the decelerating signal when the optical disk apparatus functions as a vertical-type optical disk apparatus.

28. The optical disk apparatus of Claim 25,

wherein said digital signal processor controls the light beam emitted from the optical disk apparatus which performs recording into the recording medium having first and second information faces.

said digital signal processor comprises:

a focus condition detecting means for detecting a focus condition of the light beam irradiating the information faces on the basis of the digital signal from the AD converter;

a focus control means for driving the moving unit and controlling the light beam, so that the focus condition of the light beam becomes a prescribed focus condition on the basis of an output signal from said focus condition detecting means; and

a focus jumping means for driving the moving unit so that the focal point of the light beam moves from one of the first and second information faces of the recording medium to the other information face;

said focus jumping means comprising;

an accelerating means for generating an accelerating signal for moving the focal point of the light beam from one of said first and second information faces of the recording medium to the other information face; and

a decelerating means for generating a decelerating signal for decelerating the moving speed of the focal point of the light beam;

said digital signal processor is adjusted such that a peak value and/or a time interval of the decelerating signal are changeable according to the moving direction of the focal point of the light beam, and

the peak value and the time interval of the decelerating signal are determined so that a product of the peak value and the time interval of the decelerating signal is varied according to the moving direction of the focal point of the light beam.

29. An optical disk apparatus comprising:

a focusing means for focusing a light beam on a recording medium having first and second information faces;

a moving means for moving a focal point of the light beam focused by said focusing means in a direction substantially perpendicular to the information faces of the recording medium;

a light detecting means for detecting a reflected light of the focused light beam from the recording medium;

a focus condition detecting means for detecting a focus condition of the light beam irradiating the information faces on the basis of an output signal from said light detecting means;

a focus control means for driving said moving means on the basis of an output signal from said focus condition detecting means, and controlling the light beam so that the focus condition of the light beam becomes a prescribed focus condition; and

a focus jumping means for moving the focal point of the light beam from the first information face to the second information face by driving said moving means;

said focus jumping means comprising;

an accelerating means for generating an accelerating signal for moving the focal point of the light beam from one of the first and second information faces of the recording medium to the other information face; and

a decelerating means for generating a decelerating signal for decelerating the moving speed of the focal point of the light beam;

wherein the decelerating signal is determined by a digital signal processor, and a product of a peak value and a time interval of the decelerating signal for moving the focal point of the light beam from the upper information face to the lower information face when the optical disk apparatus functions as a horizontal-type optical disk apparatus, is larger than a product of the peak value and the time interval of the decelerating signal when the optical disk apparatus functions as a vertical-type optical disk apparatus.

30. The optical disk apparatus of Claim 26,

wherein said digital signal processor controls the light beam emitted from the optical disk apparatus which performs recording into the recording medium having first and second information faces,

said digital signal processor comprises;

a focus condition detecting means for detecting a focus condition of the light beam irradiating the information faces on the basis of the digital signal from the AD converter;

a focus control means for driving the moving unit and controlling the light beam, so that the focus condition of the light beam becomes a prescribed focus condition on the basis of an output signal from said focus condition detecting means; and

a focus jumping means for driving the moving unit so that the focal point of the light beam moves from one of the first and second information faces of the recording medium to the other information face;

said focus jumping means comprising;

an accelerating means for generating an accelerating signal for moving the focal point of the light beam from one of said first and second information faces of the recording medium to the other information face; and

a decelerating means for generating a decelerating signal for decelerating the moving speed of the focal point of the light beam;

said digital signal processor is adjusted such that a peak value and/or a time interval of the decelerating signal are changeable according to the moving direction of the focal point of the light beam, and

the peak value and the time interval of the decelerating signal are determined so that a product of the peak value and the time interval of the decelerating signal is varied according to the moving direction of the focal point of the light beam.

31. A digital signal processor for controlling a light beam of an optical disk apparatus on a recording medium having first and second information faces, the optical disk apparatus including a focusing lens for focusing a light beam on the recording medium having first and second information faces, a moving unit for moving a focal point of the light beam focused by the focusing lens in a direction substantially perpendicular to the information faces of the recording medium, a photodetector for detecting a reflected light of the focused light beam from the recording medium, an AD converter for converting an output signal from the photodetector to a digital signal, the digital signal processor comprising:

a focus condition detecting means for detecting a focus condition of the light beam irradiating the information faces on the basis of the digital signal from the AD converter;

a focus control means for driving the moving unit and controlling the light beam, so that the focus condition of the light beam becomes a prescribed focus condition on the basis of an output signal from said focus condition detecting means and a plurality of parameters; and

a focus jumping means for driving the moving unit so that the focal point of the light beam jumps to a target information face which is one of the first information faces and the second information faces; and

a storage means for storing signals obtained when the focal point of the light beam is passed through the first and second information faces by driving the moving unit so that the light beam goes away from or close to the recording medium;

wherein, when a focus jumping is performed by said focus jumping means, at least one of the plurality of parameters are changed according to the values stored in the storage means.

32. A digital signal processor of claim 27,

wherein, when a focus jumping is performed by said focus jumping means, a gain of said focus control means is changed according to the values stored in the storage means.

33. An apparatus as claimed in claim 28, wherein said storage means stores signals corresponding to an amount of reflected light which is detected by said light detecting means when the focal point of the light beam is passed through the first and second information faces by driving said moving means so that the light beam goes away from or close to the recording medium.

34. An apparatus as claimed in claim 29, wherein, when the focus jumping is performed by said focus jumping means, a focus control lead-in level is set according to the values stored in said storage means.

35. An apparatus as claimed in claim 29, wherein a focus control lead-in level for the focus jumping is set according to the value stored in said storage means, a gain of which is changed according to the values stored in said storage means.

36. An apparatus as claimed in claim 28, wherein said storage means stores focus condition detecting signals obtained when the focal point of the light beam is passed through the first and second information faces by driving said moving means so that the light beam goes away from or close to the recording medium, wherein said focus condition detecting signal comprises at least one of a gain, an offset, and a level, and wherein, when the focus jumping is performed by said focus jumping means, at least one of a gain, an offset, and a level of said focus control means is changed according to the values stored in said storage means.

37. An apparatus as claimed in claim 32, wherein, when the focus jumping is performed by said focus jumping means, a focus control lead-in level is set according to the values stored in said storage means.

38. An apparatus as claimed in claim 32, wherein a focus control lead-in level for the focus jumping is set according to the value stored in said storage means, a gain of which is changed according to the values stored in said storage means.

39. A digital signal processor for controlling light beam of an optical disk apparatus on a recording medium having first and second information faces, the optical disk apparatus including a moving unit for moving a focal point of the light beam irradiating the recording medium so that the focal point crosses a track on the recording medium, the digital signal processor comprising:

a tracking control means for detecting a positional error between the focal point of the light beam and the track on the recording medium, driving the moving unit according to the track error signal, and controlling the light beam so that the focal point is positioned on the track;

a focus jumping means for jumping the focal point of the light beam to a target information face, which is one of the first information face and the second information face, and seeking the target information face;

a storage means for storing tracking condition signals for the first information face and the second information face;

an arithmetic means for performing an arithmetic operation on the tracking condition signals stored in said storage means with an output signal from the tracking control means; and

a system control means for controlling the system so that a tracking condition signal which is read out of the storage means and correspond to the target information face is used to adjust the output signal from the tracking control means, when the jumping and seeking are performed by said focus jumping means.

40. An apparatus as claimed in claim 35, wherein the tracking condition signals stored in said storage means are decentration signals which corresponding to decentrations of tracks on the first information face and the second information face, said arithmetic means is an adding means for adding the decentration signals stored in said storage means to the output signal from said tracking control means, and said system control means controls the system so that a decentration signal which is read out of said storage means and corresponds to the target information face is added to the output signal from said tracking control means, when the jumping and seeking are performed by said focus jumping means.

41. An apparatus as claimed in claim 35, wherein the tracking condition signals stored in said storage means are desired loop gains of said tracking control means for the first information face and the second information face, said arithmetic means is a multiplication means for multiplying the track gain signals stored in said storage means by an output signal from said tracking control means, and said system control means controls the system so that a tracking gain signal which is read out of said storage means and corresponds to the target information face is multiplied by the output signal from the tracking control means, when the jumping and seeking are performed by said focus jumping means.

42. An optical disk apparatus as claimed in claim 28, wherein said signals stored in said storage means are desired loop gains of said focus control means for the first information face and the second information face, and said optical disk apparatus further comprising:

a multiplication means for multiplying the focus gain signals stored in said storage means by an output signal from said focus control means; and

a system control means for controlling the system so that a focus gain signal which is read out of said storage means and corresponds to the target information face is multiplied by the output signal from said focus control means.

43. An optical disk apparatus as claimed in claim 28, wherein said signals stored in said storage means are servo offsets corresponding to desired target positions of said focus control means on the first information face and the second information face, and said optical disk apparatus further comprises:

a system control means for controlling the system so that the target position of said focus control means is changed to a focus position signal that is read out of said storage means and corresponds to the target information face.

44. An optical disk apparatus as claimed in claim 35, wherein said signals stored in said storage means are servo offsets corresponding to desired target positions of said tracking control means on the first information face and the second information face, and said optical disk apparatus further comprises:

a system control means for controlling the system so that the target position of said tracking control means is changed to a tracking position signal that is read out of said storage means and corresponds to the target information face.